a means for positioning an inspection region relative to the target region wherein the inspection region at least partially physically coincides with the target region; and

a second stage inspection system for generating the inspection region wherein the second stage inspection system produces a second set of data, said data being representative of ~~having~~ an X-ray signature characteristic of the material in said inspection region.

2. (cancelled)

3. (amended) The apparatus of claim 1 [[2]] wherein said object ~~threat~~ is at least one of an illegal drug, an explosive material, or a weapon.

4. (original) The apparatus of claim 1 wherein the means for identifying at least one target region comprises an operator selecting a region associated with each of the images.

5. (original) The apparatus of claim 4 wherein the operator selects a region based upon an X-ray image characteristic.

6. (original) The apparatus of claim 5 wherein the X-ray image characteristic is at least one of mass, degree of attenuation,

area, atomic number, size, shape, pattern, or context.

7. (original) The apparatus of claim 5 wherein the operator identifies a region in a first image as likely to be the same, or closely located to it, in a second image.

8. (original) The apparatus of claim 1 wherein the means for identifying at least one target region comprises a processor executing an algorithm to select a region associated with the images.

9. (original) The apparatus of claim 8 wherein the region associated with the images is selected based upon an X-ray image characteristic.

10. (original) The apparatus of claim 9 wherein the X-ray image characteristic is at least one of mass, degree of attenuation, area, atomic number, size, shape, pattern, or context.

11. (original) The apparatus of claim 1 wherein a plurality of X-ray beam projections from the X-ray projection systems intersects the target region at an intersection area, said target region having a location.

12. (original) The apparatus of claim 11 wherein the location

of the target region is determined by identifying a set of coordinates for the intersection area.

13. (original) The apparatus of claim 12 wherein a plurality of control commands is produced in response to the determination of said location of the target region.

14. (original) The apparatus of claim 12 wherein the inspection region is positioned relative to the target region in response to the plurality of control commands using a three-axis control system.

15. (original) The apparatus of claim 1 wherein the means for positioning said inspection region relative to the target region includes a plurality of adjustable apertures.

16. (original) The apparatus of claim 15 wherein the apertures can be physically moved in the direction of the main beam axis.

17. (original) The apparatus of claim 16 wherein the aperture is a ring aperture having an adjustable diameter.

18. (original) The apparatus of claim 1 wherein the means for positioning said inspection region relative to the target region comprises a conveyor operable to move in elevation relative to

the second stage inspection system.

19. (original) The apparatus of claim 1 wherein the means for positioning said inspection region relative to the target region comprises an aperture and ring aperture.

20. (original) The apparatus of claim 1 wherein the second stage inspection system comprises an inspection region generation system.

21. (original) The apparatus of claim 20 wherein the inspection region generation system comprises a source of X-ray radiation.

22. (original) The apparatus of claim 21 wherein the inspection region generation system comprises an energy dispersive detector.

23. (original) The apparatus of claim 20 wherein the inspection region generation system comprises an array of transmission detectors.

24. (original) The apparatus of claim 20 wherein the inspection region generation system comprises an energy dispersive detector and an array of transmission detectors.

25. (original) The apparatus of claim 24 wherein the energy dispersive detector is used to produce a signature of the material in the inspection region and the array of transmission detectors is used to produce data defining at least one of mass, degree of attenuation, area, average atomic number, of the material in a beampath.

26. (original) The apparatus of claim 23 or 24 wherein the array of transmission detectors is in a ring formation.

27. (original) The apparatus of claim 24 wherein the array of transmission detectors comprises high energy and low energy detectors.

28. (original) The apparatus of claim 27 wherein data generated from the transmission detectors is used to identify a reference spectrum.

29. (original) The apparatus of claim 28 wherein said identification of a reference spectrum is achieved by identifying a spectrum associated with data generated from both the high energy detectors and the low energy detectors.

30. (original) The apparatus of claims 27, 28 or 29 wherein said second set of data comprises high energy and low energy

transmission data characteristic of the X-ray properties of the material in a beampath.

31. (original) The apparatus of claim 28 wherein the reference spectrum is used to correct a diffraction spectrum.

32. (original) The apparatus of claim 28 wherein the reference spectrum is used to correct for beam hardening.

33. (original) The apparatus of claim 23 wherein data generated from the transmission detectors is used to identify a boundary of the container.

34. (original) The apparatus of claim 23 wherein data generated from the transmission detectors is used to generate an image.

35. (original) The apparatus of claim 1 wherein the X-ray signature characteristic is a diffraction pattern.

36. (original) The apparatus of claim 1 wherein the X-ray signature characteristic is a scatter spectrum.

37. (original) The apparatus of claim 1 wherein the X-ray signature characteristic is an electronic response signal.

38. (original) The apparatus of claim 1 further comprising a processor in data communication with at least one of the first stage inspection system or the second stage inspection system wherein the processor is capable of executing a neural network to process at least one of the first set of data or the second set of data to determine the existence of a threat.

39. (original) The apparatus of claim 38 wherein the neural network operates as a back-propagation network having a plurality of nodes and wherein said nodes are organized in a series of successive layers, each layer comprising at least one node that receives inputs from nodes in a prior layer and transmits outputs to nodes in a subsequent layer.

40. (original) The apparatus of claim 39 wherein nodes in a first layer are weighted in accordance with their distance from at least one node in a second layer.

41. (original) The apparatus of claim 38 wherein the neural network is trained to determine the existence of the threat using a library of known threats.

42. (original) The apparatus of claim 1 wherein the inspection region encompasses portions of the container, volume within the container and volume external to the container and wherein a

composite signal is produced when the portions of the container, volume within the container and volume external to the container are exposed to said X-ray beams.

43. (original) The apparatus of claim 42 further comprising a processor to correct the composite signal by substantially removing a signal produced by exposing the volume external to the container to said X-ray beams.

44. (original) The apparatus of claim 43 wherein the volume external to the container includes air.

45. (original) The apparatus of claim 43 wherein the volume external to the container includes metal.

46. (original) The apparatus of claim 43 wherein said correction of the composite signal includes correcting for a plurality of attenuation affects caused by exposing the volume external to the container to said X-ray beams.

47. (original) The apparatus of claim 46 wherein one of said attenuation affects is beam hardening.

48. (original) The apparatus of claim 1 wherein the second set of data comprises a composite signal produced when at least two

of the container, volume within the container, or volume external to the container are exposed to said X-ray beams.

49. (original) The apparatus of claim 1 wherein the second stage inspection system comprises at least two energy dispersive detectors.

50. (original) The apparatus of claim 49 wherein the energy dispersive detectors are separated by a plurality of vanes.

51. (original) The apparatus of claim 50 further comprising four energy dispersive detectors.

52. (amended) The apparatus of claim 51 wherein <u>the vanes are placed orthogonal to the energy dispersive detectors</u>~~the energy dispersive detectors are arranged into four quadrants~~.

53. (original) A method for identifying an object concealed within a container, comprising:

generating a first set of data using a first stage inspection system having at least two X-ray projection systems;

processing said first set of data to generate at least two images using a plurality of processors in data communication with the first stage inspection system;

identifying at least one target region from the two images;

positioning an inspection region relative to the target region wherein the inspection region at least partially physically coincides with the target region;

generating the inspection region through a second stage inspection system; and

producing a second set of data having a X-ray signature characteristic of the material in the inspection region.

54. (original) The method of claim 53 wherein an operator identifies at least one target region by selecting a region associated with the images, said region being selected based upon an X-ray image characteristic.

55. (original) The method of claim 54 wherein the X-ray image characteristic is at least one of mass, degree of attenuation, total area, atomic number, size, shape, or organic to inorganic ratio.

56. (original) The method of claim 53 wherein an operator identifies at least two target regions by selecting regions associated with each of said images.

57. (original) The method of claim 56 wherein the operator identifies a region in a first image as being similar to a region in a second image.

58. (original) The method of claim 57 wherein the operator identifies the regions as being similar based upon at least one of mass, degree of attenuation, total area, atomic number, size, shape, or organic to inorganic ratio.

59. (original) The method of claim 53 wherein the at least one target region is identified by a processor executing an algorithm to select a region associated with the images.

60. (original) The method of claim 59 wherein the region associated with the images is selected based upon an X-ray image characteristic.

61. (original) The method of claim 60 wherein the X-ray image characteristic is at least one of mass, degree of attenuation, total area, atomic number, size, shape, or organic to inorganic ratio.

62. (original) The method of claim 53 wherein the at least one target region is identified by a processor executing an algorithm to select at least two regions associated with each of

said images.

63. (original) The method of claim 62 wherein the processor identifies a region in a first image as being similar to a region in a second image.

64. (original) The method of claim 63 wherein the processor identifies the regions as being similar based upon at least one of mass, degree of attenuation, total area, atomic number, size, shape, or organic to inorganic ratio.

65. (original) The method of claim 53 wherein a plurality of X-ray beam projections from the X-ray projection systems intersect the target region at an intersection area, said target region having a location.

66. (original) The method of claim 65 wherein the location of the target region is determined by identifying a set of coordinates for the intersection area.

67. (original) The method of claim 66 wherein a plurality of control commands is produced in response to the determination of said location of the target region.

68. (original) The method of claim 67 wherein the inspection

region is positioned relative to the target region in response to the plurality of control commands using a three-axis control system.

69. (original) The method of claim 53 wherein the positioning of the inspection region relative to the target region is achieved using a plurality of adjustable apertures.

70. (original) The method of claim 69 wherein the aperture can be physically moved horizontally or vertically.

71. (original) The method of claim 69 wherein the aperture is a ring aperture having an adjustable diameter.

72. (original) The method of claim 53 wherein the positioning of the inspection region relative to the target region is achieved using a conveyor operable to move in elevation relative to the second stage inspection system.

73. (original) The method of claim 53 wherein the positioning of the inspection region relative to the target region is achieved using an aperture and ring aperture.

74. (original) The method of claim 53 wherein the second stage inspection system comprises an energy dispersive detector.

75. (original) The method of claim 53 wherein the second stage inspection system comprises an array of transmission detectors.

76. (original) The method of claim 53 wherein the second stage inspection system comprises an energy dispersive detector and an array of transmission detectors.

77. (original) The method of claim 76 wherein the energy dispersive detector is used to produce a signature of the material in the inspection region and the array of transmission detectors is used to produce data defining at least one of mass, degree of attenuation, area, average atomic number, of the material in a beampath.

78. (original) The method of claim 75 or 76 wherein the array of transmission detectors is in a ring formation.

79. (original) The method of claim 75 wherein the array of transmission detectors comprises high energy and low energy detectors.

80. (original) The method of claim 79 wherein a reference spectrum is determined by identifying a spectrum associated with data generated from both the high energy detectors and the low

energy detectors.

81. (original) The method of claim 80 wherein the reference spectrum is used to correct a diffraction spectrum.

82. (original) The method of claim 80 wherein the reference spectrum is used to correct for beam hardening.

83. (original) The method of claim 75 wherein data generated from the transmission detectors is used to identify a boundary of the container.

84. (original) The method of claim 53 wherein the X-ray signature characteristic is a diffraction pattern.

85. (original) The method of claim 53 wherein the X-ray signature characteristic is a scatter spectrum.

86. (original) The method of claim 53 wherein the X-ray signature characteristic is an electronic response signal.

87. (original) The method of claim 53 further comprising the step of executing a neural network to process at least one of the first set of data or the second set of data to determine the existence of a threat.

88. (original) The method of claim 87 wherein the neural network operates as a back-propagation network having a plurality of nodes and wherein said nodes are organized in a series of successive layers, each layer comprising at least one node that receives inputs from nodes in a prior layer and transmits outputs to nodes in a subsequent layer.

89. (original) The method of claim 88 wherein nodes in a first layer are weighted in accordance with their distance from at least one node in a second layer.

90. (original) The method of claim 87 wherein the neural network is trained to determine the existence of the threat using a plurality of libraries.

91. (original) The method of claim 90 wherein the plurality of libraries are accessible via a network.

92. (original) The method of claim 91 wherein the plurality of libraries comprise at least one library of threats and at least one library non-threats.

93. (original) The method of claim 92 wherein the plurality of libraries further comprises at least one buffer library.

94. (original) The method of claim 53 wherein the second stage inspection system comprises at least two energy dispersive detectors.

95. (original) The method of claim 94 wherein the energy dispersive detectors are separated by a plurality of vanes.

96. (original) The method of claim 53 wherein the second stage inspection system comprises four energy dispersive detectors.

97. (amended) The method of claim 96 wherein the vanes are placed orthogonal to the energy dispersive detectors~~the energy dispersive detectors are arranged into four quadrants~~.

98. (original) The method of claim 97 wherein the energy dispersive detectors are separated by a plurality of vanes.

99. (original) An apparatus for identifying an object concealed within a container, comprising:

a first stage inspection system having at least two X-ray projection systems to generate a first set of data;

a plurality of processors in data communication with the first stage inspection system wherein the

processors process said first set of data to generate at least two images;

a processor executing an algorithm for selecting a region associated with each image;

a means for positioning an inspection region relative to the target region wherein the inspection region at least partially physically coincides with the target region; and

a second stage inspection system for generating the inspection region wherein the second stage inspection system produces a second set of data having an X-ray signature characteristic of the material in said inspection region.

100. (original) The apparatus of claim 99 wherein the region associated with the images is selected based upon an X-ray image characteristic.

101. (original) The apparatus of claim 100 wherein the X-ray image characteristic is at least one of mass, degree of attenuation, area, atomic number, size, shape, pattern, or context.

102. (original) An apparatus for identifying an object concealed within a container, comprising:

a first stage inspection system having at least two X-ray projection systems to generate a first set of data;

a plurality of processors in data communication with the first stage inspection system wherein the processors process said first set of data to generate at least two images;

a processor executing an algorithm for selecting a region associated with each image;

a means for positioning an inspection region relative to the target region wherein the inspection region at least partially physically coincides with the target region; and

a second stage inspection system for generating the inspection region wherein the second stage inspection system produces a second set of data having an X-ray signature characteristic of the material in said inspection region and comprises an array of transmission detectors.

103. (original) The apparatus of claim 102 wherein the second stage inspection system further comprises an energy dispersive detector.

104. (original) The apparatus of claim 103 wherein the energy dispersive detector is used to produce a signature of the

material in the inspection region and the array of transmission detectors is used to produce data defining at least one of mass, degree of attenuation, area, average atomic number, of the material in a beampath.

105. (original) The apparatus of claim 102 wherein the array of transmission detectors comprises high energy and low energy detectors.

106. (original) The apparatus of claim 105 wherein a reference spectrum is determined by identifying a spectrum associated with data generated from both the high energy detectors and the low energy detectors.

107. (original) The apparatus of claim 106 wherein the reference spectrum is used to correct a diffraction spectrum.

108. (original) The apparatus of claim 106 wherein the reference spectrum is used to correct for beam hardening.

109. (original) An apparatus for identifying an object concealed within a container, comprising:

a first stage inspection system having a X-ray projection system to generate a first set of data;

a processor in data communication with the first stage inspection system wherein the processor processes said first set of data, said first set of data being indicative of a target region;

a second stage inspection system for generating an inspection region proximate to the target region wherein the second stage inspection system produces a second set of data; and

a processor capable of executing a neural network to process the second set of data to determine the existence of a threat.

110. (original) The apparatus of claim 109 wherein the neural network operates as a back-propagation network having a plurality of nodes and wherein said nodes are organized in a series of successive layers, each layer comprising at least one node that receives inputs from nodes in a prior layer and transmits outputs to nodes in a subsequent layer.

111. (original) The apparatus of claim 110 wherein nodes in a first layer are weighted in accordance with their distance from at least one node in a second layer.

112. (original) The apparatus of claim 111 wherein the neural network is trained to determine the existence of the threat

using a plurality of libraries.

113. (original) The apparatus of claim 112 wherein the libraries are accessible via a network.

114. (original) The apparatus of claim 113 the libraries comprise at least one of a threat library, a non-threat library, and a buffer library.